

Claims

1. A biodegradable segmented block copolymer comprising polyol residues characterised in that the polyol residues have a molecular weight of at least 4000 Daltons and in that the polyol residues are connected by acetal linkages.
2. A biodegradable segmented block copolymer as claimed in claim 1 in which the acetal linkages comprise polyacetal residues.
3. A biodegradable segmented block copolymer as claimed in claim 2 in which the polyacetal residues comprise enzyme degradable polyacetal/diamino acid ester blocks.
4. A biodegradable segmented block copolymer as claimed in claim 2 in which the polyacetal residues comprise an incorporated bioactive diol.
5. A biodegradable segmented block copolymer as claimed in claim 2 in which the polyacetal residues comprise both enzyme degradable polyacetal/diamino acid ester blocks and incorporated bioactive agent.
6. A biodegradable segmented block copolymer as claimed in any one of claims 1 to 5 in which the segmented block copolymer is blended with other polymeric and/or ceramic and/or glass material.
7. A biodegradable segmented block copolymer as claimed in any of the claims 1 to 6 in which the polyol residues have a molecular weight of at least 5000 Daltons.
8. A biodegradable segmented block copolymer as claimed in any one of claims 1 to 6 in which the polyol residues have a molecular weight between 4000 and 20000 Daltons.
9. A biodegradable segmented block copolymer as claimed in any preceding claim in which polyol residues comprise polyesters.

10. A biodegradable segmented block copolymer as claimed in claim 9 in which the polyester is chosen from the group: homo-polymers of polycaprolactone (PCL), copolymers of polycaprolactone (PCL), polylactic acid (PLA, L and D forms), polyglycolic acid (PGA), polydioxanone, aliphatic esters or aromatic ester.
11. A biodegradable segmented block copolymer as claimed in any one of claims 1 to 8 in which the polyol comprises a degradable carbonate.
12. A biodegradable segmented block copolymer as claimed in any one of claims 1 to 8 in which the polyol residues comprise polyamide.
13. A biodegradable segmented block copolymer as claimed in any one of claims 1 to 8 in which the biodegradable segmented block copolymer comprises a compound from the group: polyglycolic acid (PGA), polycaprolactone (PCL) or polylactic acid (PLA).
14. A biodegradable segmented block copolymer as claimed in any one of claims 1 to 8 in which the biodegradable segmented block copolymer comprises a biocompatible inorganic material.
15. A biodegradable segmented block copolymer as claimed in claim 14 in which the biocompatible inorganic material is from the group: calcium carbonate, hydroxyapatite (HA) or tricalcium phosphate (TCP).
16. A biodegradable segmented block copolymer as claimed in any preceding claim in which the polyol residue comprises polyesters with a melting point between about 50°C and 80°C.
17. A biodegradable segmented block copolymer as claimed in any preceding claim in which a stabiliser or accelerator is blended into or polymerised into the biodegradable segmented block copolymer.
18. A biodegradable segmented block copolymer as claimed in any one of claims 1 to 5 in which the segmented block copolymer comprises whether blended in or reacted with or other, a biological active agent.

19. A biodegradable segmented block copolymer as claimed in claim 18 wherein said agent is selected from the group consisting of a growth factor, an antibiotic, a strontium salt, a fluoride salt, a magnesium salt, a sodium salt, a bone morphogenetic factor, a chemotherapeutic agent, a pain killer, a bisphosphonate, a bone growth agent, an angiogenic factor, and combinations thereof.
20. A biodegradable segmented block copolymer as claimed in claim 19 wherein said growth factor is selected from the group consisting of platelet derived growth factor (PDGF), transforming growth factor b (TGF-b), insulin-related growth factor-I (IGF-I), insulin-related growth factor-II (IGF-II), fibroblast growth factor (FGF), beta-2-microglobulin (BDGF II), bone morphogenetic protein (BMP), and combinations thereof.
21. A biodegradable segmented block copolymer as claimed in claim 19 wherein said antibiotic is selected from the group consisting of tetracycline hydrochloride, vancomycin, cephalosporins, and aminoglycosides such as tobramycin, gentacin, and combinations thereof.
22. A biodegradable segmented block copolymer as claimed in claim 19 wherein said growth is selected from the group consisting of proteins of demineralised bone, demineralised bone matrix (DBM), bone protein (BO), bone morphogenetic protein (BMP), osteonectin, osteocalcin, osteogenin, and combinations thereof.
23. A biodegradable segmented block copolymer as claimed in claim 19 wherein said agent is selected from the group consisting of cis-platinum, ifosfamide, methotrexate, doxorubicin hydrochloride, and combinations thereof.
24. A biodegradable segmented block copolymer as claimed in claim 19 wherein said pain killer is selected from the group consisting of lidocaine hydrochloride, bipivacain hydrochloride, non-steroidal anti-

inflammatory drugs such as ketorolac tromethamine, and combinations thereof.

5 25. A biodegradable segmented block copolymer as claimed in any one of the preceding claims in which the biodegradable segmented block copolymer is reinforced with a reinforcing material.

26. A biodegradable segmented block copolymer as claimed in claim 25 in which the reinforcing material is a polymer filler particulate.

10 27. A biodegradable segmented block copolymer as claimed in claim 25 in which the reinforcing material is a fibre. (eg continuous fibre, short fibre or other).

28. A biodegradable segmented block copolymer as claimed in any one of the preceding claims in which the biodegradable segmented block copolymer is a coating on a medical device eg. nail, screw or boneplate, anchor, suture.

15 29. A biodegradable segmented block copolymer as claimed in any one of claims 1 to 27 in which the biodegradable segmented block copolymer forms in whole, or part, a medical device e.g. nail, screw, suture, boneplate or other.

20 30. A medical device comprising a biodegradable segmented block copolymer as claimed in any one of claims 1 to 27.

31. A method of manufacture of a medical device comprising the step of forming in situ a biodegradable segmented block copolymer as claimed in any one of claims 1 to 27.